

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN OR RELATING TO MOULD ASSEMBLIES

- (71) We, THE BRITISH UNITED SHOE MACHINERY COMPANY LIMITED, a British Company, of Union Works, Belgrave Road, in the City of Leicester, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:
- 10 The present invention is concerned with improvements in or relating to mould assemblies adapted for use in the moulding of shoe bottom units on to shoe upper assemblies.
- 15 The term "shoe" is used herein generically to include boots, slippers, sandals and the like, and includes the article during the course of its manufacture.
- 20 There are presently being used, for the moulding of shoe bottom units on to shoe upper assemblies, mould assemblies comprising a sole mould member provided with a recess in the form of a shoe bottom unit said recess being bounded by an upstanding
- 25 peripheral wall, an upwardly-facing surface of the wall having a heightwise contour corresponding generally to the heightwise contour of the welt of a shoe.
- 30 By the term "sole mould member of the kind referred to" as used herein we mean a sole mould member of the kind set out in the last preceding paragraph.
- 35 In the specification of U.K. Patent application No. 44360/65, (Serial No. 1 169 531), there is described by way of example a mould assembly for use in the moulding of a shoe bottom unit on to a flat lasted upper assembly and comprising a sole mould member of the kind referred to and two carrier
- 40 members mounted one either side of the sole mould member for movement relative thereto between closed positions in which the carrier members abut against each other and fit closely around the sole mould member
- 45 and open positions in which the carrier members are separated from each other and from the sole mould member. The carrier members are each provided with a welt plate which welt plates provide welt closure portions of the mould assembly and which in the closed positions of the carrier members project partially over the recess of the sole mould member, under surfaces of the welt plates being in sealing engagement with the upwardly-facing surface around the length thereof. In the use of said mould assembly, a flat lasted upper assembly mounted on a foot form is positioned against the recess, the upper assembly extending partially into the recess, the carrier members being in their open positions. The carrier members are then moved to their closed positions, the welt plates sliding over the surface of the wall and into engagement with the upper assembly around the feather line thereof, pressing the upper against the foot form into engagement therewith. On completion of the closing of the mould assembly, plastics material in fluid condition is injected into the recess.
- 50 55 60 65 70 75
- Heretofore shoe manufacturers desiring to utilise the advantages provided by a mould assembly of the kind described in the above-mentioned specification have been involved in costly replacement of their existing mould assemblies, (of the kind comprising a sole mould member and two side mould members).
- 80 Further, there has been requested a mould assembly suitable for use in the moulding of a shoe bottom unit on to a shoe upper assembly comprising, at a forepart, a welt margin of normal width, and at a backpart, a welt margin narrower than normal, said mould assembly providing some at least of the advantages provided by a mould assembly of the kind described in the above-mentioned specification.
- 85 There will be described hereinafter, to illustrate the invention by way of example, 90
- [Price 25p]

two illustrative mould assemblies and the methods by which they are made, the methods of making the mould assemblies also being illustrative of the invention in certain of its aspects.

The first illustrative mould assembly comprises a sole mould member, a wall member to which the sole mould member is secured and two carrier members mounted one either side of the sole mould member for movement relative thereto between closed positions and open positions. The wall member is of generally uniform thickness and bounds the whole of a moulding surface of the sole mould member, said moulding surface corresponding to the wear surface of a shoe bottom unit and defining, together with an inwardly-facing surface of the wall member, a recess having the size and shape of the shoe bottom unit to be moulded on to a shoe upper assembly, said inwardly-facing surface extending generally at right angles to said moulding surface and extending above said moulding surface a height corresponding to the depth of the said shoe bottom unit.

Secured to each of the carrier members is a welt plate, providing a welt closure portion of the mould assembly; in the closed positions of the carrier members the welt plates overlie the wall member, being in sealing engagement with an upwardly-facing surface of the wall member, and project partially over the recess short distances inwardly of the inwardly-facing surface of the wall member.

The sole mould member is releasably secured to the wall member by positioning means, provided by pins each extending through one of a series of bores extending transversely through the wall member and into one of a series of bores extending into the sole mould member. By selection of those bores through which each pin extends, the heightwise position at which the sole mould member is secured relative to the wall member may be adjusted to provide a required depth of shoe bottom unit to be moulded on to a shoe upper assembly.

The first illustrative mould assembly is made by a first illustrative method involving the adaption and modification of a mould assembly of a known kind comprising a base plate, a sole mould member secured to the base plate and two side mould members, each having secured thereto a welt plate, mounted on the base plate one either side of the sole mould member for movement relative thereto between open positions separated from the sole mould member and closed positions in which the side mould members abut against each other and against the sole mould member, a moulding surface of the sole mould member and inwardly-facing surfaces of the side mould members defining, in the closed positions of the side

mould members, a recess in the form of a shoe bottom.

In the first illustrative method, of making the first illustrative mould assembly, a mould assembly of the kind set out in the last preceding paragraph is procured, the welt plates are removed from the side mould members and the side mould members are moved to their closed positions and secured together by welding them along the parting lines of their inwardly-facing surfaces.

Each of the side mould members is then cut, along a line spaced a short distance from the inwardly-facing surface thereof, said cut extending completely through the depth of the side mould member generally parallel to that is, continuously equidistant from, the inwardly-facing surface thereof. The two side mould members thereby provide a wall member bounding the sole mould member and two carrier members one either side of the sole mould member.

The welt plates are then secured to the carrier members, said welt plates projecting beyond inwardly-facing surfaces of the carrier members distances slightly greater than the thickness of the wall member and provide welt closure portions of the first illustrative mould assembly.

A series of four sets of bores is then provided in, and extending transversely through, the wall member. Each set comprises four bores axes of which intersect a line slightly inclined to the base plate. A corresponding series of four sets of bores is also provided extending into the sole mould member, each set comprising four bores axes of which intersect a line parallel to the base plate.

In the use of the first illustrative mould assembly, the depth of shoe bottom unit to be moulded on to a shoe upper is selected, the sole mould member is lifted from the base plate and four positioning pins are inserted, each through an appropriate bore of one set of the wall member and into an appropriate bore in the sole mould member.

With the carrier members in their open positions, (corresponding to the open positions of the original side mould members), a flat lasted shoe upper assembly, mounted on a foot form, is positioned against the recess. The carrier members are moved to their closed positions, the welt plates moving across the wall member, providing a seal between under sides of the welt plates and the wall member, and into engagement with the upper, pressing the upper at the feather line thereof into engagement with the foot form.

The second illustrative mould assembly comprises a sole mould member, a wall member to which the sole mould member is secured, an end-part mould member providing a backpart mould member and two carrier members. The wall member of generally uniform thickness and bounds part of the

sole mould member between a forepart thereof and a heel breast region thereof.

The backpart mould member is fixed relative to the wall member at a backpart portion thereof, an inwardly-facing surface of the backpart mould member providing a continuation of an inwardly-facing surface of the wall member and bounding the sole mould member between the backpart thereof and said heel breast region. In the second illustrative mould assembly, the backpart mould member and the wall member are integral. A moulding surface of the sole mould member, corresponding to the wear surface of a shoe bottom unit, the inwardly-facing surface of the wall member and the inwardly-facing surface of the backpart mould member together define a recess having the size and shape of a shoe bottom unit to be moulded on to a shoe upper assembly.

The carrier members are mounted on either side of the sole mould member for movement relative thereto between open positions and closed positions. Secured to each carrier member and to the backpart mould member is a welt plate. The welt plate of the backpart mould member projects partially over the recess a short distance inwardly of said inwardly-facing surface thereof, and in the closed positions of the carrier members, the welt plates thereof overlie the wall member and project partially over the recess short distances inwardly of said inwardly-facing surface of the wall member.

The second illustrative mould assembly is made by a second illustrative method involving the adaption and modification of a mould assembly of a known kind comprising a base plate, a sole mould member secured to the base plate and two side mould members, each having secured thereto a welt plate, mounted on the base plate on either side of the sole mould member for movement relative thereto, by mould closing mechanism, between open positions separated from the sole mould member and closed positions in which the side mould members abut against each other and against the sole mould member, a moulding surface of the sole mould member and inwardly-facing surfaces of the side mould members defining, in closed positions of the side mould members, a recess in the form of a shoe bottom unit.

In the second illustrative method, of making the second illustrative mould assembly, a mould assembly of the kind set out in the last preceding paragraph is procured, the welt plates are removed from the side mould members the side mould members thereof are moved to their closed positions and secured together by welding them along the parting lines of their inwardly-facing surfaces.

Each of the side mould members is then

cut, along a line spaced a short distance from the inwardly-facing surface thereof, said line extending around the sole mould member from the heel breast region, around the forepart thereof and back to the heel breast region on the opposite side of the sole mould member, and to outer surfaces of the side mould members, said cut extending completely through the depth of the side mould members perpendicularly therethrough.

The side mould members thereby provide a wall member and a backpart mould member integral with the wall member, the wall member bounding part of the sole mould member and the backpart mould member bounding the rest of the sole mould member, the moulding surface of the sole mould member, an inwardly-facing surface of the wall member and an inwardly-facing surface of the backpart mould member defining a mould cavity in the form of a shoe bottom unit, and two carrier members mounted on either side of the sole mould member.

The welt plates are then resecured and are cut at the heel breast region, the portions of the welt plates extending backwardly of the heel breast region together providing the welt plate secured to the backpart mould member which provides a backpart welt closure portion of the mould assembly and the portions of the welt plates extending forwardly of the heel breast region providing the welt plates secured to the carrier members which provide side and forepart welt closure portions of the second illustrative mould assembly.

The welt plate secured to the backpart mould member projects partially over the recess a short distance inwardly of the inwardly-facing surface thereof and the welt plates secured to the carrier members project beyond inwardly-facing surfaces thereof distances slightly greater than the thickness of the wall member.

In the use of the second illustrative mould assembly, the carrier members are moved to their open positions, (corresponding to the open positions of the original side mould members), and a flat lasted shoe upper assembly, mounted on a foot form, is positioned against the recess, the backpart of the upper assembly closing against the backpart welt closure portion into a sealing engagement therewith extending from the heel breast region around the backpart and back to the heel breast region.

The carrier members are moved to their closed positions, the welt plates thereof moving across the wall member, providing a seal between under sides of the welt plates and the wall member, and into engagement with the upper along a line extending from the heel breast region thereof around the forepart and back to the breast region on the opposite side, pressing the upper at the

feather line thereof into engagement with the foot form.

The present invention provides a mould assembly for use in the moulding of shoe bottom units on to shoes and comprising (a) a sole mould member having a moulding surface corresponding to the wear surface of a shoe bottom, (b) a wall member to which the sole mould member is releasably secured and comprising an inwardly-facing surface which bounds part at least of the moulding surface of the sole mould member, and (c) two carrier members mounted one either side of the sole mould member, each having secured thereto a welt closure portion and being mounted for movement relative to the sole mould member between open and closed positions in which closed positions the welt closure portions overlie the wall member projecting marginally inwardly of the inwardly-facing surface thereof.

The present invention also provides a method of making a mould assembly for use in the moulding of shoe bottom units on to shoes and comprising the steps: (a) procuring a mould assembly comprising a sole mould member having a moulding surface corresponding to the wear surface of a shoe bottom and two side mould members mounted one either side of the sole mould member between open and closed positions each side mould member comprising an inwardly-facing surface which surfaces in the closed positions of the side mould members bound the said moulding surface and provide, together with said moulding surface, a recess in the form of a shoe bottom unit, (b) with the side mould members in their closed positions securing the side mould members together adjacent the parting lines of their inwardly-facing surfaces, (c) cutting the side mould members along a line spaced a short distance from said inwardly-facing surfaces and extending at least part way around the sole mould member to provide a wall member having an inwardly-facing surface bounding part at least of the moulding surface of the sole mould member and two carrier members, to each of which a welt closure portion may be secured, detached from the wall member.

There will now be given a detailed description, to be read with reference to the drawings accompanying the provisional specification, of the first and second illustrative mould assemblies and the methods by which they are made. It is to be understood that these illustrative mould assemblies and these methods have been selected to illustrate the invention by way of example only, and not by way of limitation thereof.

In the drawings:—

Figure 1 is a plan view of a mould assembly of known kind, welt plates thereof

having been removed, showing the line along which side mould members thereof are cut in the making of the first illustrative mould assembly;

Figure 2 is a plan view of the first illustrative mould assembly in an open condition;

Figure 3 is a sectional view of the first illustrative mould assembly in a closed condition;

Figure 4 is a side view of part of a sole mould member of the first illustrative mould assembly showing positioning means of the assembly;

Figure 5 is a plan view of a mould assembly of known kind, welt plates thereof having been removed, showing the line along which the side mould members are cut in the making of the second illustrative mould assembly;

Figure 6 is a plan view of the second illustrative mould assembly in an open condition; and

Figure 7 is a plan view of the second illustrative mould assembly in a closed condition.

The first illustrative mould assembly (see Figures 2 and 3) is similar in certain aspects to the mould assembly described in the specification of U.K. Patent application No. 44360/65, (Serial No. 1 169 531), and comprises a base plate 2, a composite bottom mould member 4 mounted on the base plate 2, and two carrier members 6 and 8 slidably mounted on the base plate one either side of the bottom mould member for movement relative thereto between closed positions, corresponding to a closed condition of the mould assembly, and open positions, corresponding to an open condition of the mould assembly.

The bottom mould member 4 comprises, secured together, a sole mould member 10 and a sleeve member to which the sole mould member is releasably secured resting on the base plate and providing a peripheral wall member 12 of generally uniform thickness bounding the whole of the sole mould member. The sole mould member is secured to the peripheral wall member in a desired position above the base plate 2 by positioning means, (see Figures 3 and 4), a moulding surface 11 of the sole mould member 10 and an inwardly-facing surface 13 of the wall member 12 defining a recess having the size and shape of a shoe bottom unit to be moulded on to a shoe upper assembly. The positioning means is provided by four sets of bores 28 extending transversely through the peripheral wall, each set comprising four bores the axes of which are parallel and intersect a straight line slightly inclined to the base plate. The sole mould member is provided with four sets of bores 29 extending into the sole mould member, each set comprising four bores the axes of which are

parallel and intersect a straight line parallel to the base plate. By selection of those bores through which each of four pins 30 of the positioning means extend, the heightwise position at which the sole mould member is secured relative to the wall member 12 may be adjusted to provide a required depth of shoe bottom unit to be moulded on to a shoe upper assembly, (see Figure 4).

Secured to the carrier members 6 and 8 are welt plates 7 and 9, respectively, providing welt closure portions of the illustrative mould assembly. In the closed positions of the carrier members the welt plates overlie the peripheral wall member, being in a sealing engagement with an upwardly-facing surface 14 of the wall member, and project partially over the recess short distances inwardly of the inwardly-facing surface 13 of the wall member, (see Figure 3).

The first illustrative mould assembly is made by a first illustrative method involving the adaption and modification of a mould assembly of a known kind. A mould assembly of known kind is procured, said mould assembly comprising a base plate, a sole mould member 10a secured to the base plate and two side mould members 6a and 8a mounted on the base plate on either side of the sole mould member for movement relative thereto, by mould closing mechanism (not shown), between open positions separated from the sole mould member and closed positions in which the side mould members abut against each other and the sole mould member 10a, (see Figure 1), a moulding surface 11a of the member 10a and inwardly-facing surfaces 13a of the members 6a and 8a defining, in the closed positions of the side mould members, a recess in the form of a shoe bottom unit, each side mould member 6a and 8a having secured thereto a welt plate.

The welt plates are removed from the side mould members and the side mould members are moved to their closed positions, (in which positions of the side mould members the mould assembly is shown in Figure 1). The side mould members are then welded together along the parting lines of their inwardly-facing surfaces, and each is cut, along a line spaced a short distance outwardly from the inwardly-facing surface thereof, (the line being indicated A in Figure 1), said cut extending completely through the depth of the side mould member generally parallel to the inwardly-facing surface and perpendicular to the base plate.

The side mould members 6a and 8a thereby provide said sleeve member providing the peripheral wall member 12 of the first illustrative mould assembly, and two carrier members 6 and 8 one either side of the sole mould member.

The welt plates are secured to the carrier

members to provide the welt closure portions of the first illustrative mould assembly.

The sole mould member is removed from the base plate, and the series of bores 29 are provided therein (see Figures 3 and 4); the series of bores 28 are provided in the peripheral wall member, and the bottom mould member is secured to the peripheral wall member by the pins 30 of the positioning means to provide said composite bottom mould member 4 of the first illustrative mould assembly.

On adjustment of the position relative to the wall member of the sole mould member by said positioning means, the first illustrative mould assembly is used in a manner similar to the use of the mould assembly described in detail in the specification of the mentioned U.K. Patent application.

The second illustrative mould assembly (see Figures 6 and 7) comprises a base plate, (not shown), a composite bottom mould member 54 mounted on the base plate, two carrier members 56 and 58 slidably mounted on the base plate one either side of the bottom mould member for movement relative thereto between closed positions, corresponding to a closed condition of the illustrative assembly, and open positions, corresponding to an open condition of the illustrative assembly, and an end-part mould member providing a backpart mould member 78.

The bottom mould member 54 (see Figure 6) comprises, secured together, a sole mould member 60 and a sleeve member resting on the base plate and providing a wall member 62 of generally uniform thickness bounding a major part of the sole mould member, between a forepart thereof and a heel breast region thereof. The backpart mould member 78 is fixed relative to the wall member, being integral with the wall member, an inwardly-facing surface 79 of the member 78 providing a continuation of an inwardly-facing surface 63 of the wall member and bounding the sole mould member 60 between a backpart thereof and said heel breast region, a moulding surface 61 of the sole mould member, and the inwardly-facing surfaces 79 and 63 defining a recess having the size and shape of a shoe bottom unit to be moulded on to a shoe upper assembly.

Secured to the carrier member 56 and 58 are welt plates 57 and 59, respectively; secured to the backpart mould member is a welt plate 80. In the closed positions of the carrier members, the welt plates 57 and 59 overlie an upwardly-facing surface 64 of the wall member and project partially over the recess short distances inwardly of said surface 63 of the wall member, leading edge portions of the plates 57 and 59 providing continuations of the leading edge portion of the plate 80.

The second illustrative mould assembly is made by a second illustrative method, involving by the adaption and modification of a mould assembly of known kind. A mould assembly, similar to the mould assembly procured in the making of the first illustrative mould assembly, is procured, said mould assembly comprising a base plate, a sole mould member 60a secured to the base plate and two side mould members 56a and 58a mounted on the base plate one either side of the sole mould member, each side mould member supporting a welt plate.

The welt plates are removed from the side mould members and the side mould members are moved to their closed positions, (in which positions of the side mould members the mould assembly is shown Figure 5). The side mould members are then welded together along the parting lines of their inwardly-facing surfaces and each side mould member is cut along a line B-B, said cut extending completely through the depth of the side mould member perpendicular to the base plate.

The line B-B comprises five regions; first and fifth regions U and Y respectively, extend generally lengthwise of the mould assembly from a backpart of the side mould members 56a and 58a respectively. Second and fourth regions V and X respectively, extend from the first and fifth regions, respectively, at obtuse included angles of about 95° relative thereto towards opposite sides of a heel breast region of the sole mould member 60a, said regions each approaching the inwardly-facing surfaces 63a, 63a of the side mould members at acute angles thereto and terminating a short distance therefrom. The third region W bounds the sole mould member between the forepart thereof and the heel breast region thereof extending around the forepart of the sole mould member a uniform short distance from the inwardly-facing surfaces between the second and fourth portions (see Figure 5).

The welt plates are then secured to the cut side mould members and are themselves cut at heel breast regions thereof along lines one extending parallel to the second region V, the other parallel to the fourth region W, of the line B-B, (see Figures 5 and 6).

The side mould members 56a and 58a thereby provide the sleeve member providing the wall member 62 and the two carrier members 56 and 58 and the backpart mould member 78 of the second illustrative mould assembly, and the welt plates provide the welt plates 57 and 59 secured to the first and second carrier members, respectively, and the welt plate 80 secured to the backpart mould member.

In the closed positions of the carrier members, the welt plates 57 and 59 extend inwardly of the surface 63 of the wall member

uniform distances, equal to the distances terminal portions of the welt plate 80 extend inwardly of the surface 79 of the backpart mould member 78. However, the welt plate 80, at a portion thereof adjacent the heel end, is reduced, and thereby extends inwardly of the surface 79 a distance smaller than said uniform distance.

In the use of the second illustrative mould assembly, the carrier members 56 and 58 are moved to their open positions, see Figure 6 (corresponding to the open positions of the original side mould members 56a and 58a), and a flat lasted shoe upper assembly, mounted on a foot form, is positioned against the recess, the backpart of the upper assembly closing against the welt plate 80, (which provides a backpart welt closure portion of the second illustrative mould assembly), into a top-closing, sealing, engagement therewith. The carrier members 56 and 58 are moved to their closed positions, the welt plates 57 and 59, (which provide side and forepart welt closure portions of the assembly), moving across the peripheral wall member in a sealing engagement therewith, and into engagement with the upper of the upper assembly, pressing the upper into engagement with the foot form at the feather line thereof.

Molten polyvinyl chloride is injected into the recess, and, on solidification thereof, the mould assembly is opened.

A shoe is removed from the foot form, said shoe having a moulded on shoe bottom unit comprising, at the forepart thereof, a welt margin of normal width and at the backpart thereof a welt margin narrower than normal, said shoe bottom unit having no vertical flash lines at the toe and heel ends thereof.

WHAT WE CLAIM IS:—

1. A mould assembly for use in the moulding of shoe bottom units on to shoes and comprising (a) a sole mould member having a moulding surface corresponding to the wear surface of a shoe bottom, (b) a wall member to which the sole mould member is releasably secured and comprising an inwardly-facing surface which bounds part at least of the moulding surface of the sole mould member, and (c) two carrier members mounted one either side of the sole mould member, each having secured thereto a welt closure portion and being mounted for movement relative to the sole mould member between open and closed positions in which closed positions the welt closure portions overlie the wall member projecting marginally inwardly of the inwardly-facing surface thereof.

2. A mould assembly in accordance with claim 1 wherein the inwardly-facing surface of the wall member bounds the whole of the moulding surface of the sole mould member,

the moulding surface of the sole mould member and the inwardly-facing surface of the wall member providing a recess in the form of a shoe bottom unit.

5 3. A mould assembly in accordance with claim 1 wherein the heightwise position at which the sole mould member is secured to the wall member may be varied.

4. A mould assembly in accordance with claim 1 comprising an end-part mould member secured to the wall member, an inwardly-facing surface of which end-part mould member provides a continuation of the inwardly-facing surface of the wall member and bounds that part of the moulding surface not bounded by the inwardly-facing surface of the wall member.

5. A mould assembly in accordance with claim 4 wherein the end-part mould member is integral with the wall member.

6. A mould assembly in accordance with claim 4 comprising an end-part welt closure portion secured to the end-part mould member and which projects marginally inwardly of the inwardly-facing surface thereof.

7. A mould assembly in accordance with claim 6, the construction and arrangement being such that in the use thereof a lasted shoe upper assembly is pressed against the mould assembly, an end-part of the feather line of the shoe upper assembly engaging the end-part closure portion.

8. A mould assembly in accordance with claim 7, the construction and arrangement being such that in the use thereof consequent upon the pressing the lasted shoe upper assembly against the end-part closure portion the carrier members are moved to their closed positions, in which closed positions the welt closure portions thereof engage the upper around the feather line thereof.

9. A method of making a mould assembly for use in the moulding of shoe bottom units on to shoes and comprising the steps: (a) procuring a mould assembly comprising a sole mould member having a moulding surface corresponding to the wear surface of a

shoe bottom and two side mould members mounted one either side of the sole mould member and movable relative to the sole mould member between open and closed positions each side mould member comprising an inwardly-facing surface which surfaces in the closed positions of the side mould members bound the said moulding surface and provide, together with said moulding surface, a recess in the form of a shoe bottom unit, (b) with the side mould members in their closed positions securing the side mould members together adjacent the parting lines of their inwardly-facing surfaces, (c) cutting the side mould members along a line spaced a short distance from said inwardly-facing surfaces and extending at least part way around the sole mould member to provide a wall member having an inwardly-facing surface bounding part at least of the moulding surface of the sole mould member and two carrier members, to each of which a welt closure portion may be secured, detached from the wall member.

10. A method in accordance with claim 9 comprising the steps: (d) securing to each carrier member a welt closure portion such that on movement of the carrier members into closed positions the closure portions overlie part at least of the wall member and project marginally inwardly of the inwardly-facing surface thereof.

11. A mould assembly in accordance with claim 1 constructed, arranged and adapted to be used substantially as hereinbefore described with reference to the drawings accompanying the provisional specification.

12. A method in accordance with claim 9 when carried out substantially as hereinbefore described with reference to the drawings accompanying the provisional specification.

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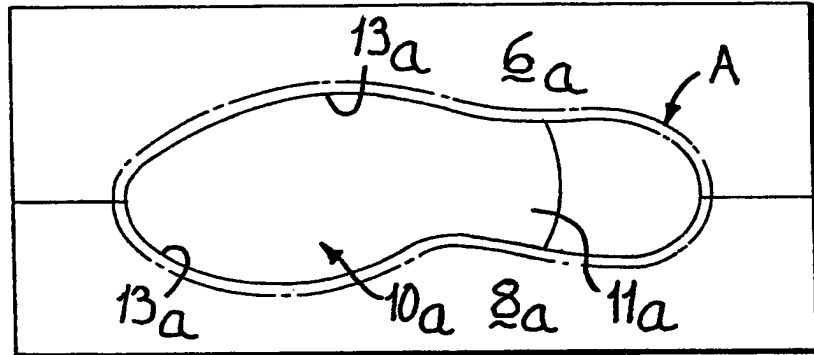
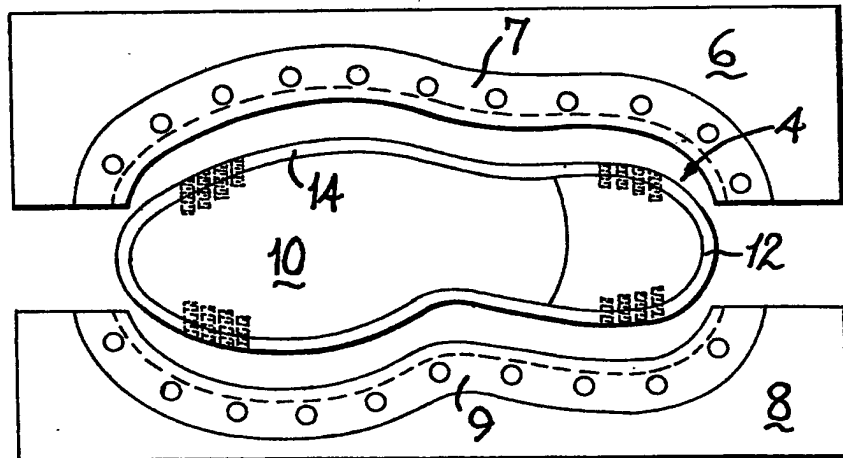


Fig-1

Fig-2



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4 SHEETS

PROVISIONAL SPECIFICATION

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the Original on a reduced scale.
SHEET 2

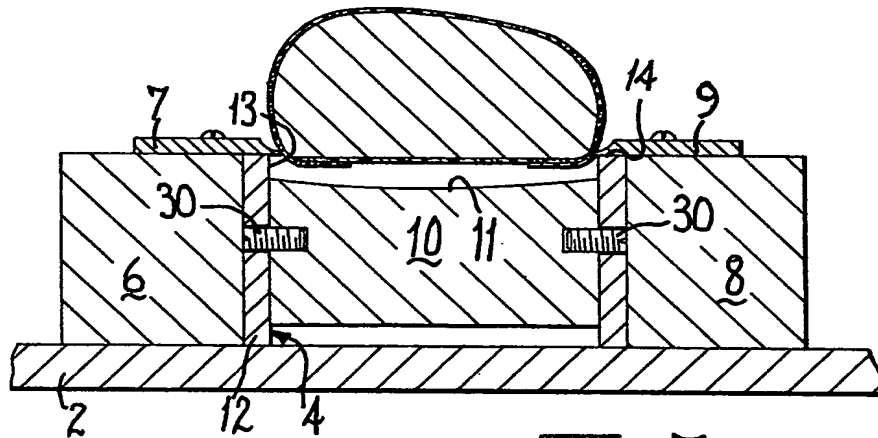


Fig-3

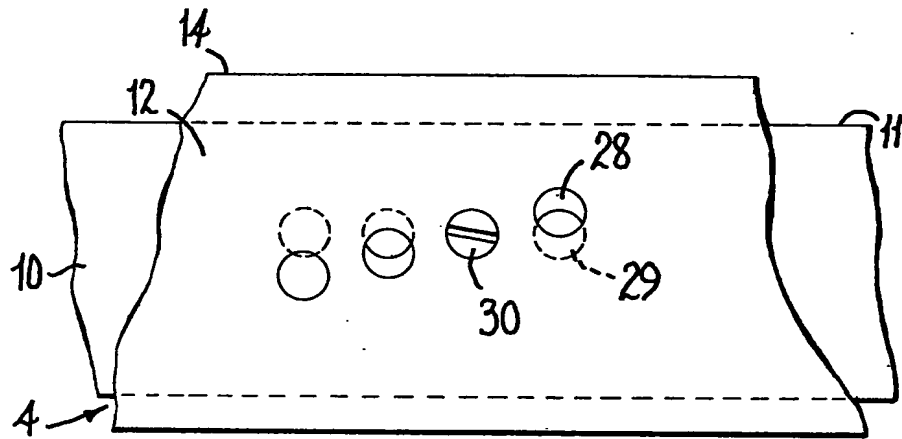


Fig-4

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4 SHEETS

PROVISIONAL SPECIFICATION

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SHEET 3

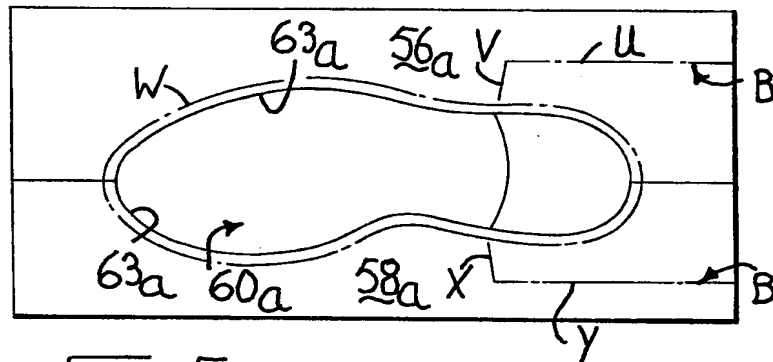
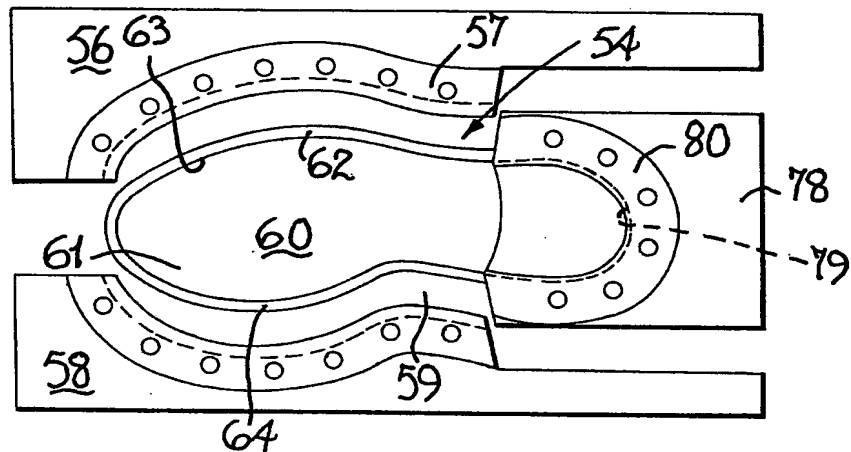


Fig. 5

Fig. 6



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PROVISIONAL SPECIFICATION

4 SHEETS

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SHEET 4

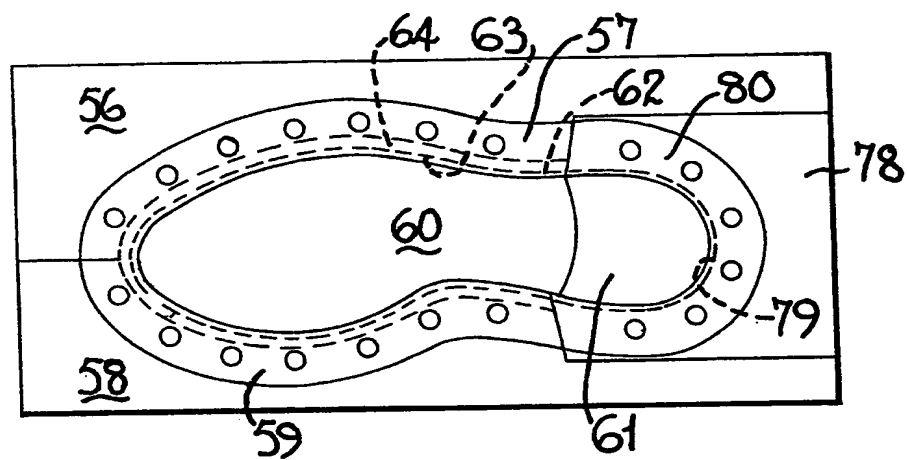


Fig. 7

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